Booster Activities

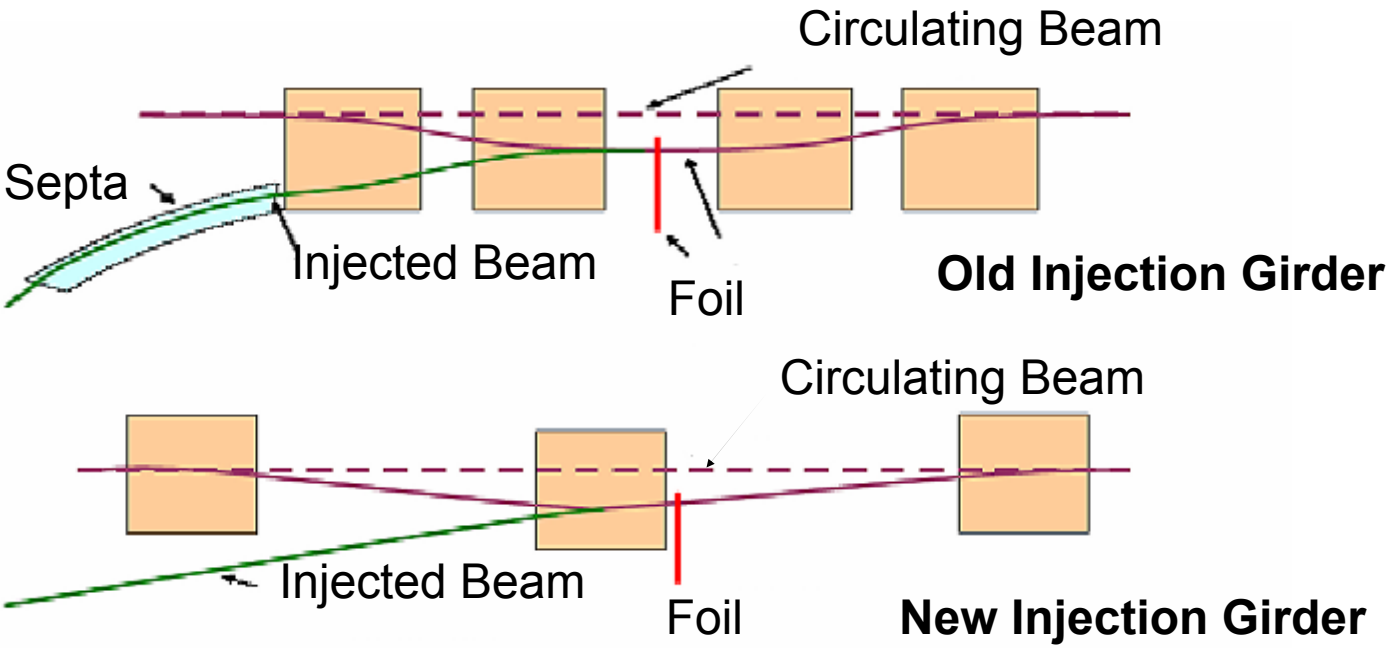
Eric Prebys
AD/PS

Major Proton Source Shutdown Projects

- New injection bump (ORBUMP) scheme installed and 400 MeV line reconfigured
  - Will allow higher rep rate
  - Improves injection orbit matching and reduces losses
- RF cavity drift tube cooling completed
  - Will allow higher rep. rate
- One of the two extraction regions removed from Booster and relocated to the MI-8 transfer line
  - Reduces losses during acceleration cycle
- New 13.8 kV transformers and switch gear installed for Booster RF system
  - Improved reliability at high rep. rate
- 400 MeV line LVPS replacement
  - Better reliability and stability of Booster injection
- Sump water rerouting
  - preventive maintenance for Tritium issue

ORBMP/Injection

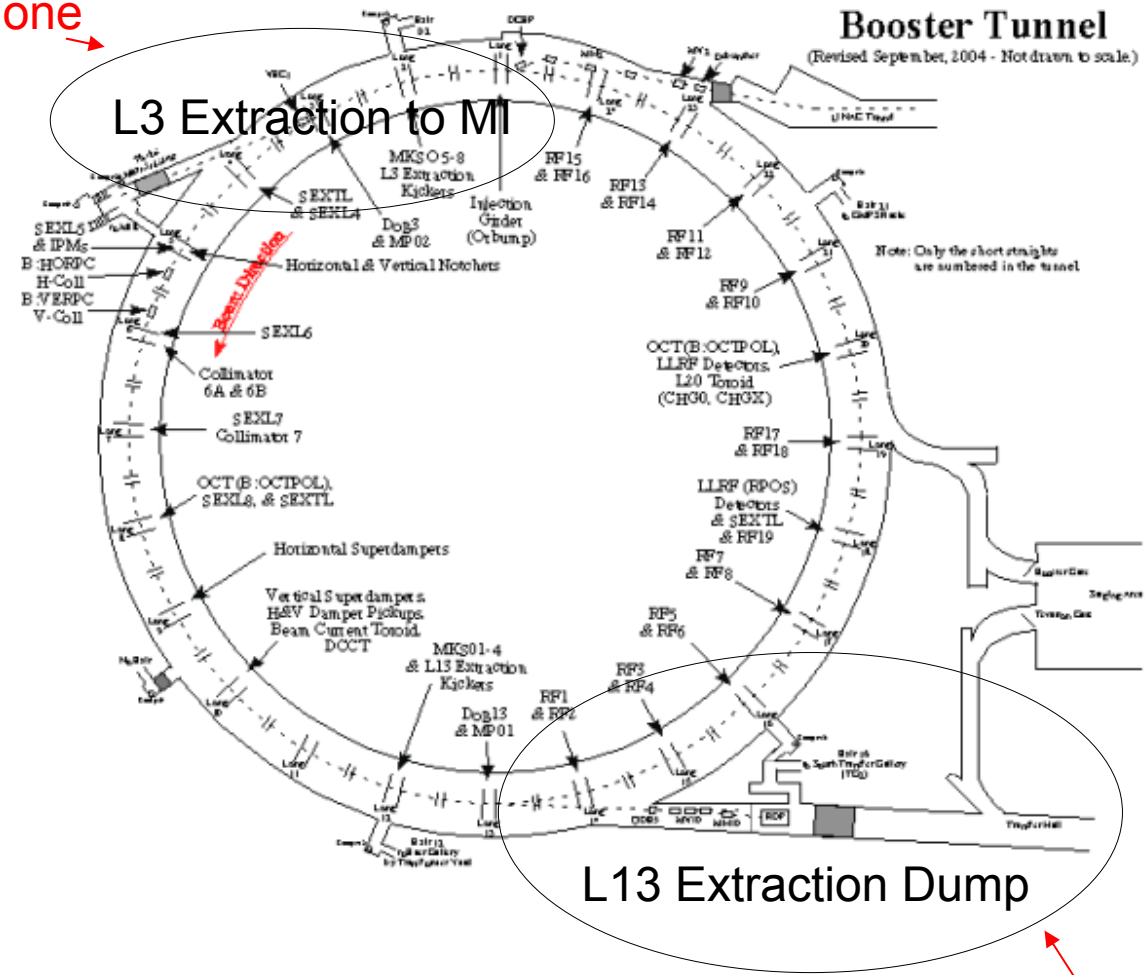
- New Booster Injection - ORBMP Girder & PS
  - A simplified 3 bump injection scheme
    - Septum magnet not required
    - Better lattice match
    - Alignment of circulating beam with Injected beam
    - Reduced edge focusing effects
    - Total power *cut in half*



Provided by Jim Lackey and Fernanda Garcia

Booster Dump Relocation

Left alone

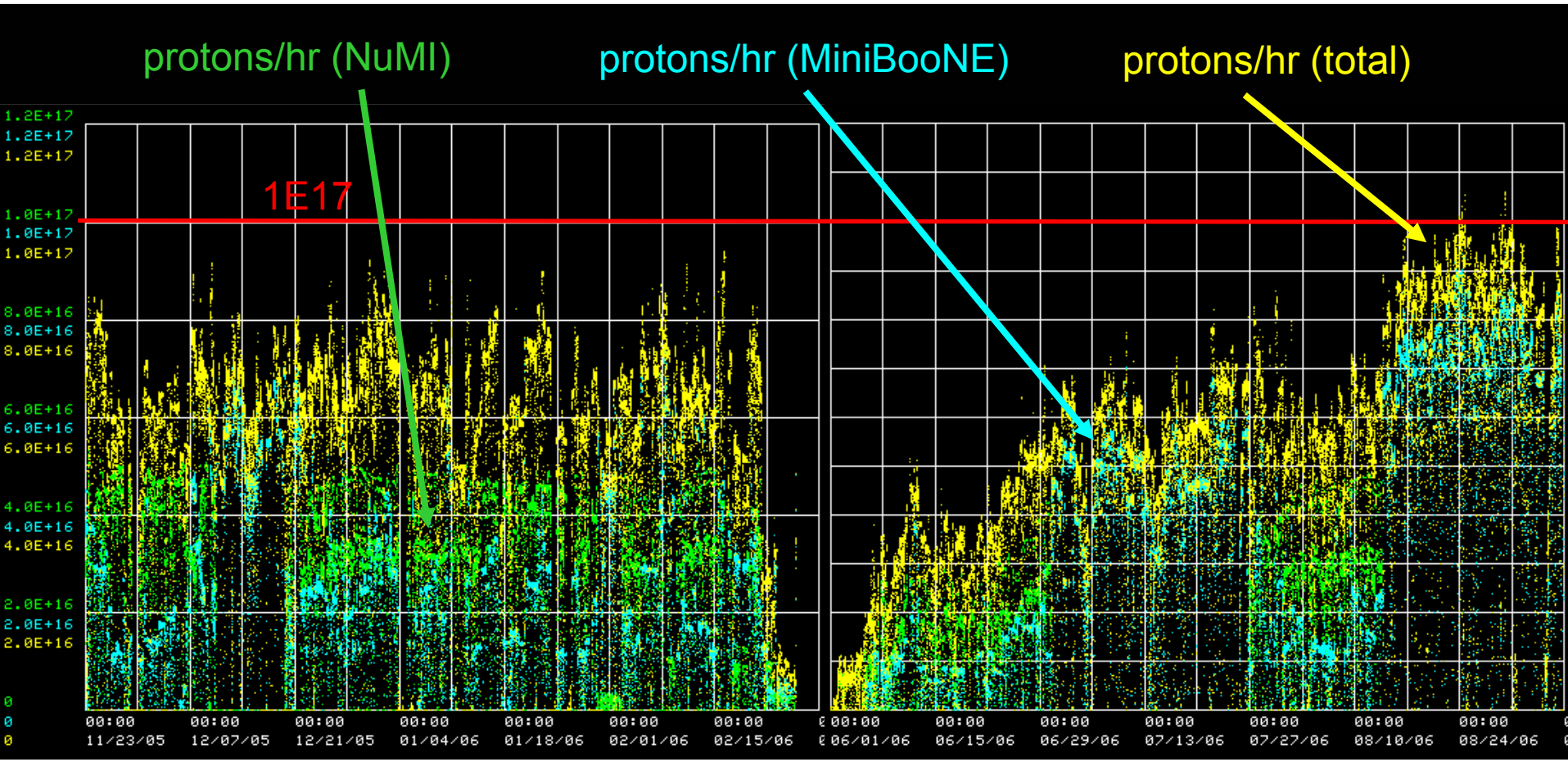


relocated to the MI-8 transfer line

Effects of Shutdown Work

- Better Injection matching
  - Beam motion reduced from 1 cm to ~2mm
- Record efficiency -> Record performance
  - Hourly rates
    - 9E16 pph MiniBooNE
    - 1E17 pph total
  - Weekly totals
    - 1.08E19 to MiniBooNE
    - 1.2E19 total
- Note: nothing that was done in this shutdown was expected to significantly increase beam to NuMI. That will come from
  - Increased up time
  - Reduced average MI cycle time
  - Slip stacking (fully operational after next shutdown)

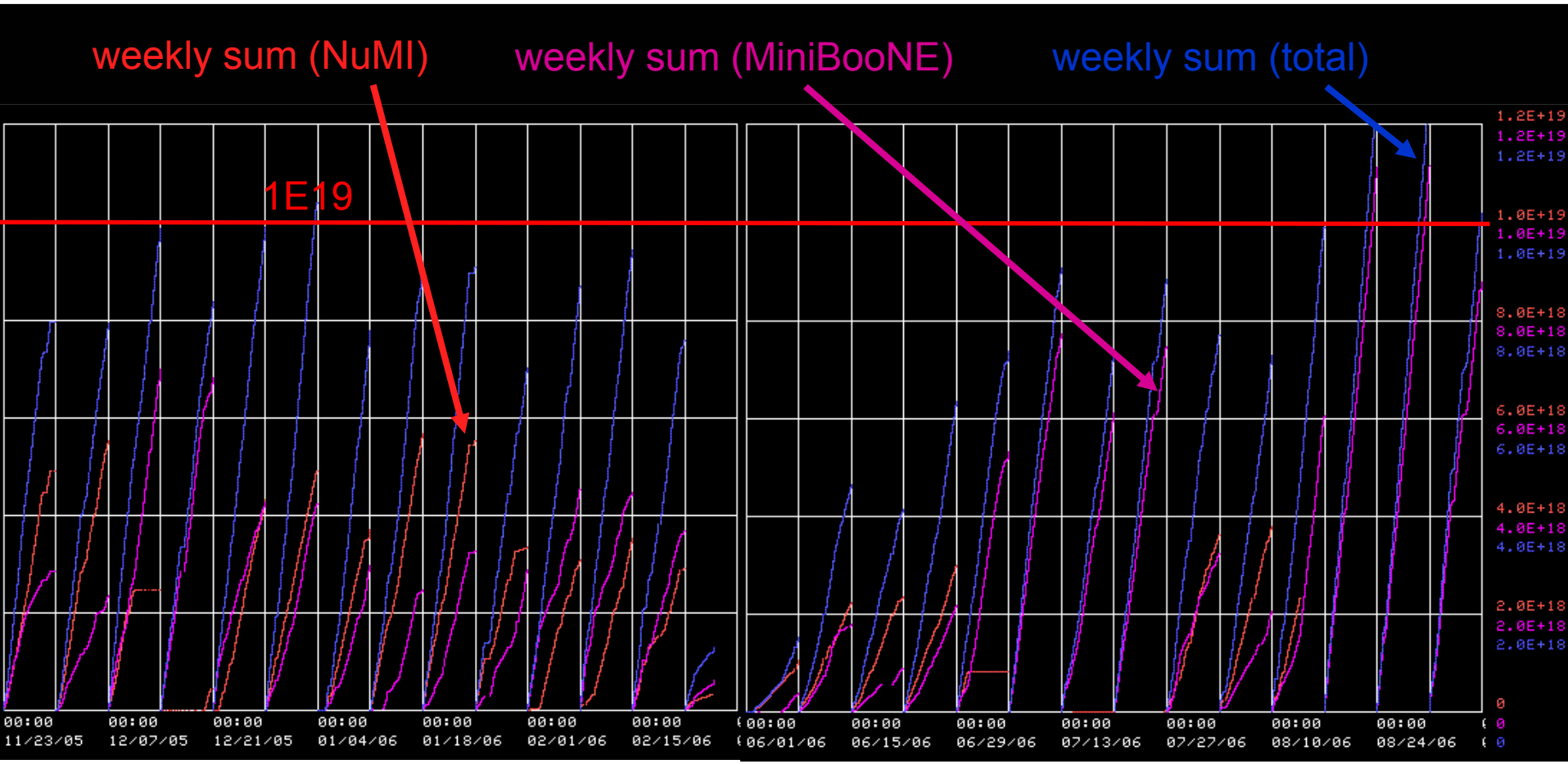
Hourly Rates



Before Shutdown

After Shutdown

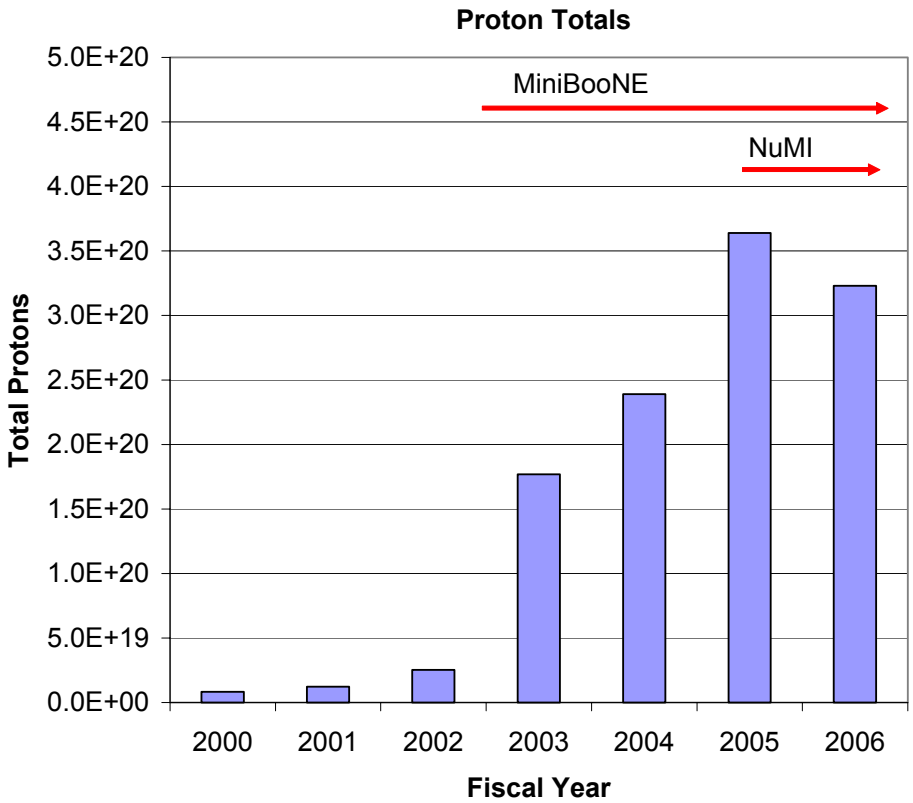
Hourly Rates



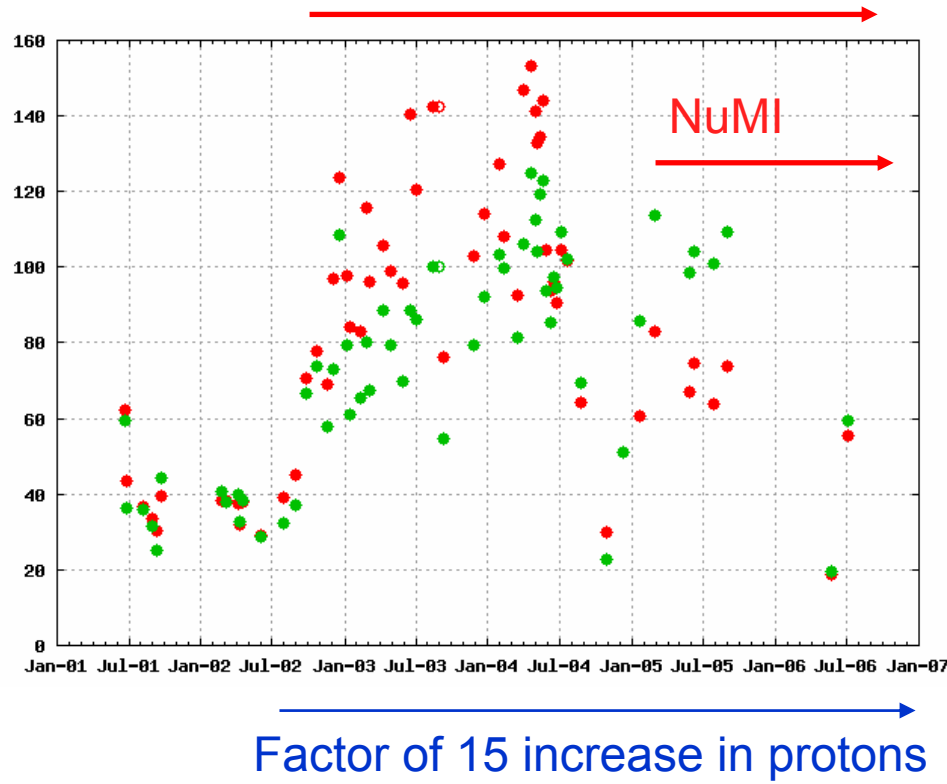
Before Shutdown

After Shutdown

Bottom Line



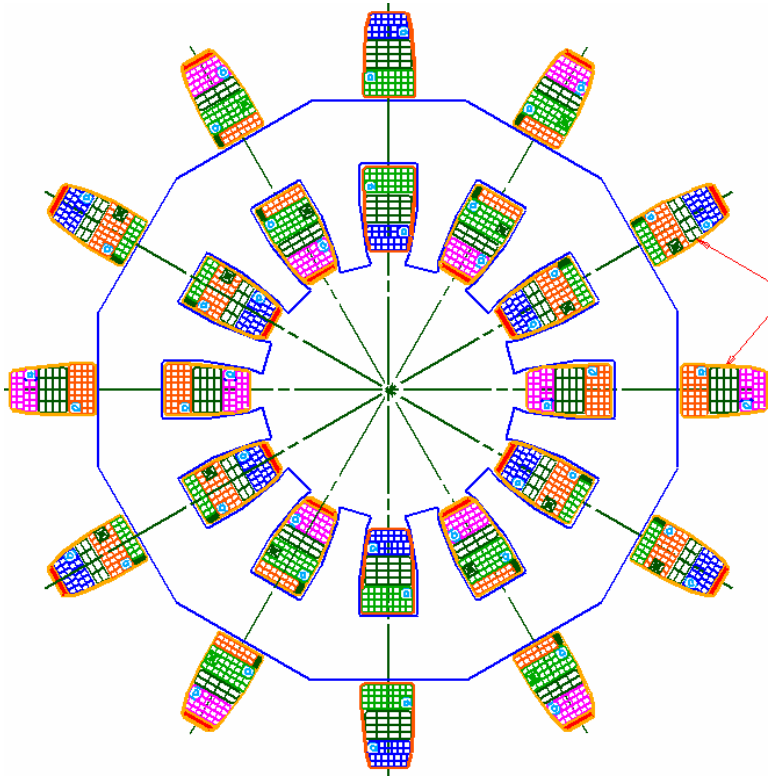
Average Activation



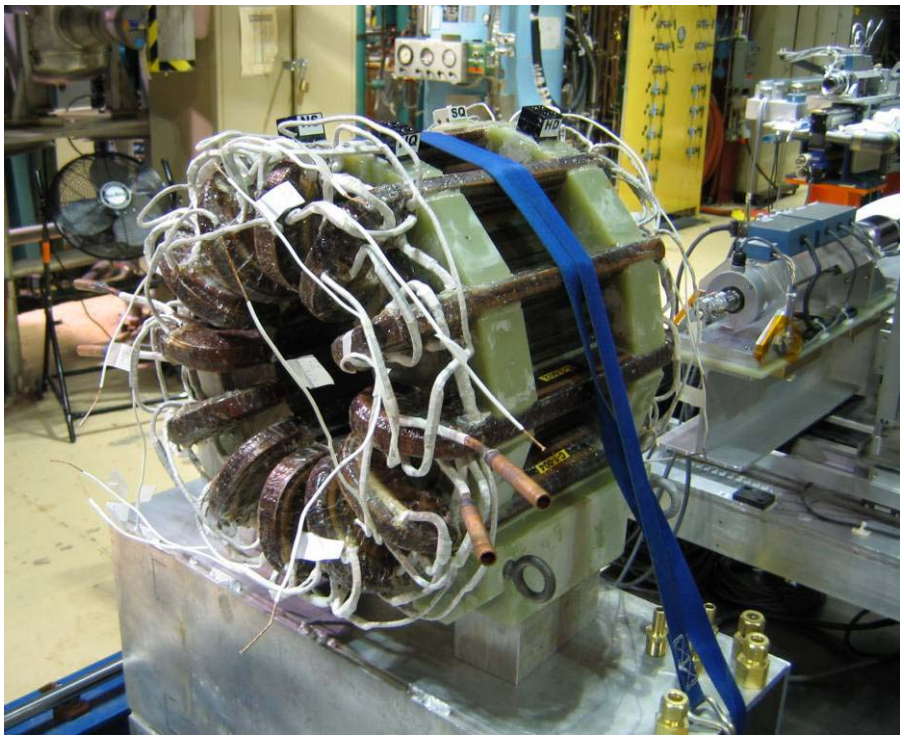
Factor of 15 increase in protons

Next (Last??) Big Thing: New Correctors

- Replace all 48 (original) Booster corrector packages.
- Six independent multipoles
  - Stronger H and V dipoles
    - ±1cm beam motion throughout cycle
  - Stronger quad
    - Arbitrary tune working point throughout cycle
  - Skew quad
    - Coupling, same strength as before.
  - Sextupole and skew sextupole at every period.
    - Less emittance blowup
    - More control of harmonic resonances.



Correctors: Status



- Testing first prototype
  - Looks good
- Just passed internal technical review
- Aggressive schedule
- Half of correctors in stalled in 2007 shutdown.
- Second half in 2008 shutdown.
- Done with Booster?